

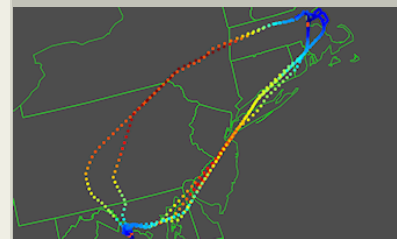
## Anomaly Detection to Improve Airspace Safety and Efficiency, Phase I

Completed Technology Project (2015 - 2015)



## Project Introduction

As the air transportation system becomes increasingly autonomous over the next twenty years, there will be an increasing need for monitoring capabilities that operate in the background to identify anomalous behaviors consistent with either safety or efficiency deficiencies. Today, these behaviors are largely detected after an incident has occurred. In July 2013, an Asiana Boeing 777 flew too low approaching San Francisco International Airport (SFO), its tail hitting a seawall and crashing into the runway. Three people died and 180 were injured. Since the weather was clear and visibility unimpeded, part of the instrument landing system (the glideslope transmitter) was offline for service, thus requiring pilots to land visually. The National Transportation Safety Board (NTSB) found that the Asiana pilots' reliance on the automated flight systems was a key factor in that crash. Further analysis by the Wall Street Journal revealed that foreign pilots required more "go-arounds" at SFO than U.S. pilots in the six weeks prior to the Asiana Airlines crash (i.e., when the glideslope transmitter was down), indicating a greater difficulty in executing the landing via visual approach. This type of anomalous behavior could have been detected prior to the crash. All of the data was available, but no one was looking at it to see these consistent, yet anomalous behaviors. Metron proposes to develop a semi-autonomous background monitoring system to apply this type of data mining and data discovery to recent historical track repositories in order to identify opportunities for improvements to safety and efficiency in airspace operations. Metron proposes a statistical approach that uses historical flight data to develop models of normal behavior, and then apply statistical methods to identify outliers under one or more indicators. Metron has used similar approaches for anomaly detection systems developed and delivered to operational customers in the land and maritime domains.



Anomaly Detection to Improve Airspace Safety and Efficiency, Phase I

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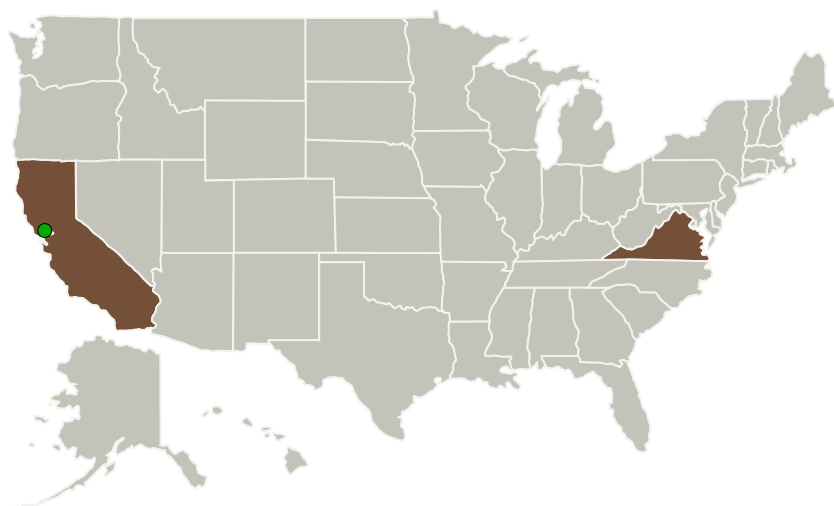
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Metron, Inc	Lead Organization	Industry	Reston, Virginia
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California	Virginia
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## Project Transitions

▶ **June 2015:** Project Start

✓ **December 2015:** Closed out

**Closeout Summary:** Anomaly Detection to Improve Airspace Safety and Efficiency, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/138702>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Metron, Inc

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

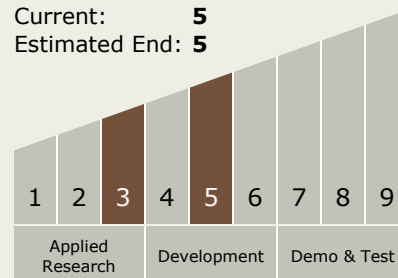
Carlos Torrez

**Principal Investigator:**

Gregory A Godfrey

## Technology Maturity (TRL)

Start: **3**  
Current: **5**  
Estimated End: **5**

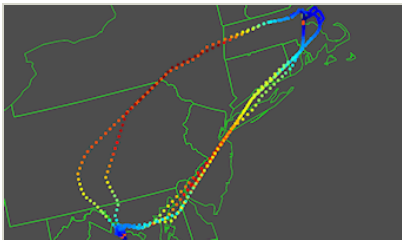


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## Images



### Briefing Chart Image

Anomaly Detection to Improve  
Airspace Safety and Efficiency,  
Phase I

(<https://techport.nasa.gov/image/131173>)

## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.3 Aero Propulsion
    - └ TX01.3.1 Integrated Systems and Ancillary Technologies

## Target Destinations

The Sun, Earth, The Moon,  
Mars, Others Inside the Solar  
System, Outside the Solar  
System